

CLAIMS

1. An undulated-wall honeycomb structure having a plurality of cell passages, which are mutually parallel in
5 channel direction;

wherein intersection portions between walls partitioning said cell passages are formed so as to maintain a predetermined pitch at cross-sections perpendicular to said cell passages and positioned systematically, and
10 wherein the wall face portions of said walls excluding said intersection portions are formed so as to have an undulated shape in both the cell passage direction and the cross-sectional direction perpendicular to said cell passage direction.

15

2. An undulated-wall honeycomb structure according to Claim 1, wherein, regarding each of said cell passages, the wall face portions of an opposing pair of said walls are each formed so as to have an undulated shape, such that
20 recessions and protrusions on one wall face portion and recessions and protrusions on the other wall face portion are positioned with the protrusions of each facing one another and the recessions of each facing one another, or with the protrusions and the recessions facing one another.

3. An undulated-wall honeycomb structure according to either Claim 1 or 2, wherein said wall face portions formed with an undulated shape and wall face portions formed with a flat shape are formed in an intermingled fashion.

5

4. An undulated-wall honeycomb structure according to any of the Claims 1 through 3, wherein, regarding each of said cell passages, at least one of said plurality of walls making up said cell passage is formed with an undulated
10 shape.

5. An undulated-wall honeycomb structure according to any of the Claims 1 through 4, wherein the undulated deformation whereby said walls are formed with an undulated
15 shape is greater at the outer portion than at the center portion.

6. An undulated-wall honeycomb structure according to any of the Claims 1 through 5, wherein the amplitude of the
20 undulated deformation of walls are formed with an undulated shape is 150% of the thickness of said walls or more.

7. An undulated-wall honeycomb structure according to any of the Claims 1 through 6, wherein a line connecting the
25 highest portions of the protrusions and/or the lowest

portions of the recessions of the wall face portions formed with an undulated shape in said cell passage direction repeats a pattern of turning in the vertical direction to said cell passage direction on said wall face.

5

8. An undulated-wall honeycomb structure according to any of the Claims 1 through 7, wherein cell passages formed by said wall face portions of said walls formed in an undulated shape and cell passages formed by said wall face portions of said walls formed in a flat shape appear and coexist in a discontinuous manner.

10
15
9. An undulated-wall honeycomb structure according to any of the Claims 1 through 8, comprising a cell passage area A formed with a generally circular cross-section from the center, and a cell passage area B formed with a generally ring-shaped form at the outer side of said cell passage area A:

wherein said cell passage area A contains cell 20 passages formed by said wall face portions of said walls formed having an undulated shape;

and wherein said cell passage area B comprises cell 25 passages formed by said wall face portions of said walls formed having a flat shape;

and wherein the thickness of the walls of the cell

PROSECUTION DOCUMENT

passages within said cell passage area B is greater than the thickness of the walls of the cell passages within said cell passage area A, and also wherein the thickness thereof increases in stages from the inner circumference portion 5 toward the outer portion or only increases in stages near the boundary between area B and area A.

10. An undulated-wall honeycomb structure according to any of the Claims 1 through 9, wherein the material thereof 10 is one or a composition of a plurality of the following group of ceramic materials: cordierite, alumina, mullite, lithium aluminum silicate, aluminum titanate, titania, zirconia, silicone nitride, aluminum nitride, and silicon carbide; or one of the following group: stainless steel, 15 aluminum alloy; or an adsorbent of either activated charcoal or silica gel or zeolite.

11. An undulated-wall honeycomb structure according to Claim 10, wherein the porosity of the material used is 20 between 45% to 80%.

12. A fine particle removing filter using the undulated-wall honeycomb structure according to Claim 11, comprising filtering layers of walls partitioning the cell 25 passages, by plugging one end of particular cell passages of

said undulated-wall honeycomb structure and also plugging the other end of the remaining cell passages.

13. A fine particle removing filter according to Claim
5 12 wherein the surface roughness of the undulated walls of
said undulated-wall honeycomb structure is 10% or more in
Valley Level.

14. A fine particle removing filter according to Claim
10 12 wherein the wall thickness of said undulated-wall
honeycomb structure is around 0.2 to 1.2 mm.

15. A fine particle removing filter according to Claim
12 wherein the cell density of said undulated-wall honeycomb
15 structure is around 50 to 600 cpsi (cells per square
centimeter).

16. An undulated-wall honeycomb structure according to
any one of the Claims 1 through 13, which is used as an
exhaust gas purification catalyst carrier for vehicles, and
carries catalyst on the surface on the cell wall face and/or
in micropores within the walls of said honeycomb structure.

17. An undulated-wall honeycomb structure according to
25 Claim 16 wherein the wall thickness is around 0.01 to 0.12

mm.

18. An undulated-wall honeycomb structure according to
Claim 16 wherein the cell density is around 200 to 3000 cpsi
5 (cells per square inch).

19. An exhaust gas purification catalytic converter,
using the undulated-wall honeycomb structure according to
Claim 16.

10 20. An exhaust gas purification catalytic converter
according to Claim 19, wherein the catalyst component is at
least one of or a compound of a plurality of the following
group: a three way catalyst, an oxide catalyst, an NOx
15 reducing catalyst, a sulfide catalyst, a volatile organic
gas VOC (Gaseous Organic Compounds), and a dioxins
decomposing-removing catalyst.

21. An exhaust gas purification catalytic converter
20 system comprising a plurality of the exhaust gas
purification catalytic converter according to Claim 19 and a
plurality of catalytic converters wherein catalyst is
carried on a normal flat-wall honeycomb structure, said
catalytic converters being serially alternately arrayed.

22. An exhaust gas purification catalytic converter system, wherein the exhaust gas purification catalytic converter according to Claim 19 is placed to the upstream side of the exhaust, and the fine particle removing filter
5 according to Claim 12 or a fine particle removing filter comprising a normal flat-wall honeycomb structure is placed to the downstream side of the exhaust.

23. An exhaust gas purification catalytic converter system according to Claim 22, wherein each of said fine
10 particle removing filters is a readily-exchangeable cartridge type.

24. An exhaust gas purification system using the undulated-wall honeycomb structure according to Claim 16,
15 for capturing fine particle substances in the exhaust gas, said exhaust gas purification system comprising:
means for charging said undulated-wall honeycomb structure and electrically capturing said fine particle
20 substances.

25. An exhaust gas purification system using the undulated-wall honeycomb structure according to Claim 16,
for capturing fine particle substances in the exhaust gas,
25 said exhaust gas purification system using non-thermal

SEARCHED INDEXED
SERIALIZED FILED

equilibrium plasma (non-thermal plasma) or microwave discharge plasma.

26. A fuel tank evaporation system using the
5 undulated-wall honeycomb structure according to Claim 16,
for suppressing external leakage of volatile components of
fuel.

27. An exhaust gas purification system according to
10 either Claim 24 or 25, wherein said undulated-wall honeycomb
structure is a readily exchangeable cartridge type
configuration.

28. A fuel cell system component using the undulated-
15 wall honeycomb structure according to Claim 16.

29. A sandwich panel using the undulated-wall
honeycomb structure according to Claim 16.

20 30. A method for manufacturing an undulated-wall
honeycomb structure, wherein a back plate having adjacent
through holes with differing material flow resistance is
used as a nozzle material for extrusion forming.

25 31. A method for manufacturing an undulated-wall

honeycomb structure according to Claim 30, wherein said back plate changes in thickness from the outer portion toward the center portion.

5 32. A method for manufacturing an undulated-wall honeycomb structure according to either Claim 30 or 31, wherein said back plate has through holes A and through holes B with differing hole diameters.

10 33. A method for manufacturing an undulated-wall honeycomb structure, wherein undulations are formed in metal foil by plasticity working beforehand, and said metal foil is wrapped in a corrugated manner, thereby forming a metal honeycomb structure.

TOP SECRET//DEFENSE